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Developing Cultural Object Repository for Preservation of Banarasi Saree Designs

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DEVELOPING CULTURAL OBJECT REPOSITORY FOR PRESERVATION OF BANARASI SAREE DESIGNS

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Abstract

Preserving the cultural, historical, and scientific heritage of civilization is very important for human culture. Every generation is aimed at keeping their cultural artifacts so that they could be used, revised, and studied by the next generations. The contemporary Information Communication Technologies have been made possible the availability of digital content on a global platform. These materials can be accessed from anywhere around the world. This article aims to propose a model for cultural object repository using modern technological tools for the preservation of Banarasi saree designs and their cultural heritage. The work has attempted to propose a model for creating a cultural object repository for preserving Banarasi saree designs. The theoretical aspect has been discussed to understand the concept and the model. The model will enable the preservation and access of these designs. This paper tried to review the possibility to develop a model for the preservation of traditional Banarasi saree designs. A repository has been created for uploading raw designs and final designs woven over sarees. The repository is also enriched with metadata and keywords.

Keywords: Cultural Preservation, Institutional repository, Cultural object repository, Digital Preservation, Information System

1. Introduction

India is the home of the world's 'great civilizations' with a social structure that can be traced back for thousands of years. The Indus valley civilization was India's first major civilization that flourished a thousand years around 2500 B.C. This civilization is known to be the birthplace of Indian art and sculpture which depicts the enormous skills and talents of those people. Indian culture and art portray virility and vivaciousness, which is refined and sophisticated, bold and robust. Cultural heritage materials have a lot of importance because culture fades into memory then disappears, but the record of culture consists of artifacts that may persist but inevitably decay (Lyman & Kahle, 1998). Preserving the cultural, historical, and scientific heritage of a community or a nation, and their thorough presentation is a long-term commitment of scholars and researchers working in archival and preservation. Every generation is aimed at keeping records about its heritage so that it could be revised and studied by the next generations. Earlier it was done by writing books and preserving actual objects by various methods. In the recent technological era, new information and multimedia technologies

introduced new methods of preservation, maintenance, and distribution of huge amounts of cultural materials. There are various conceptual and technical solutions available, such as digitalization of cultural and historical artifacts and creation of multimedia information archives, web presentations of valuable artifacts in virtual museums, galleries, digital libraries, and 3D virtual realities, which represent cultural heritage objects (Beardsley, Torr, & Zisserman, 1996).

The cultural objects represent the historical development of our societies. Ancient artifacts reveal social structure, people's life, fashion, and entertainment, as well as the technological level of that period. Modern technologies using intelligence, forensics, and computer technology will bring greater access to the cultural heritage of all times. Cultural materials are nonviolent, unbiased, cultural ambassadors. Modern digital technologies have made it a reality to exhibit large collections of works from multiple cultures and an enormous amount of historical and cultural materials have been created. Further advancing digital technologies for archiving and distributing these materials are of great importance. These materials require specialized knowledge and skill for preservation and make them available for use by scholars to the general public. The digital repository of significant cultural and historical materials has great value in preserving cultural heritage through computer technologies. Applying modern computing techniques to analyze these materials will yield insights for general purpose archiving, distribution, and intelligent automatic extraction of information from images (Chen, Wactlar, Wang, & Kiernan, 2005).

This paper aims to present a framework for developing a digital repository for the preservation of the traditional design of Banarasi Saree from different artists, methods, and historical periods. It will enable access to human knowledge in an effective way. A core feature of such a repository is that they have a common infrastructure that is highly scalable, customizable, and adaptive (Chen C.-c. , 2003).

2. Banarasi Saree Designs

Banaras is an ancient city of North India. It is situated on the river Ganges and an important pilgrimage des for Hindu religion followers. It is said to be the oldest city continuously in existence to the present and it often seems as though, over the years, life has not changed much in its narrow streets (Twain, 1897). The handloom industry of Varanasi enjoyed unbroken popularity during the ancient period and grew under the Muslim influence in the 12th century AD. The Muslims learned this art and excelled in it and were called *Chira-i-Baaf* which meant supreme cloth weavers. Persian motifs were introduced by the Persian *Nakshabandhas* (Designers) who were brought to India by Mughals during the rule of Akbar. Banaras textiles formed one of the important cargos to the west and continued until the last Mughal period. In 1764 AD the East India Company forced Banaras with French gold and silver threads, which were finer in appearance and inexpensive than the local *Badla* and *Kalabattun* (Cort, 2010). Traditional Banarasi saree designs are influenced by Persian art with a combination of Indian traditional art. These designs are composed of gold patterning on a silk ground. Most of the sources available for tracking the development of designs of Banarasi sarees are manuscripts, paintings, and old handmade design collections. There are very few actual textiles still in existence because they were either destroyed by the climate with its

alternation between wet and dry heat which is so harmful to textiles, or by the owners who were tired of old fabrics and burned them to reclaim the gold.

3. The Design making process

The designer first works out the design on paper which is destined to be reproduced on the fabric. Most of the designers draw up designs to order or invents new ones to the specification of their clients according to their ingenuity. These designers themselves are well acquainted with all the technicalities and manipulations of weaving and rendering a given design or pattern into a woven fabric. They foresee their artistic and technical aspects of reproduction and their effect and prescribe proper methods and direction for it. They do this utilizing cotton threads in the form of graph-work.

The hand-drawn designs on the paper

The designs waved over saree

Figure 2: Designs over paper and Sarees

4. Major elements of cultural object preservation

There are three major elements identified in the proposed model. The first element is the cultural content which includes the collection, creation, and preservation of digital images. The second element is metadata development and long-term storage. The third element is the presentation, retrieval, and effective use of the content. The detailed discussion of these elements is as follows;

4.1. Scanning, Creation and preservation

Cultural objects should be digitized to create an electronic archive for storage, access, preservation, and research. At the moment, digitization projects are being carried out without any standard procedures for documenting precise digitization conditions. To improve digital imaging technology for historical archiving, specialists in the field must begin to collaborate closely with technologists. We need tools that protect the integrity, fidelity, and protection of digital images while also documenting any subsequent processing. Besides, a related metadata

specification should be implemented. Topic experts should be able to encode descriptive metadata into these tools to make search and retrieval easier.

4.1.1. Imaging techniques

To make the analysis and scanning of cultural artifact collections easier, new technologies or the integration of existing technologies should be developed. To serve various audiences and applications, new multimodal rendering and presentation methods are needed. Techniques are required for degradation measurements and restoration support.

4.1.2. Scanning, compression, and standards

The data recording should be performed at a maximum resolution to facilitate high-quality image capture. New compression techniques should be incorporated for special requirements of the repositories of digital artifacts. The recording process also requires document technical metadata such as time, date, equipment, lighting, and calibration parameters. Technologies to automate the recording of technical metadata can be developed for fast digitization of large collections, as well as accruing descriptive metadata by an expert of the subject domain.

4.2. Metadata and Storage

A digital object repository of cultural artifacts not only considered as an educational and research tool but also as a powerful tool for the preservation of cultural heritage. It should also store rich metadata which includes physical details, restoration details, creation data, storage information, historical data, and associated information (Kiernan, 2004). It also requires to enrich with efficient storage, recall, and effective representation of the object (Wang, Li, & Chen, 2002).

The image attributes such as color distribution, shape, texture, and descriptors and invariant descriptors for scale, light, or point of view are obtained by statistical image analysis (Le Saux & Boujemaa, 2002). Physical features are automatically generated metadata, as distinct from descriptive metadata supplied by experts. Researchers have observed significant gaps between the features we can derive from images and the meanings of the images over time. Research to bridge these gaps is extremely important (Pappas, Angelopoulos, Kadoglou, & Pitas, 1999).

4.3. Search and Retrieval

There is a great challenge for making large collections of digital imaging content available and meaningfully accessible to the users of the cultural and historical subject domain. In general, this large and diverse audience generates demands on computer systems for simple and intuitive interfaces that require more sophistication on the underlying systems to make such new interfaces possible. The fact that a digitized work of art is not the work itself but an image of the work, acquired at a certain time, under specific conditions (size, resolution, scanner quality, light, the physical condition of the work) makes semantic-based indexing and retrieval an absolute necessity in this area. For example, a query on "*Buti*" should retrieve all images of the designs regardless of size, view angle, restoration procedures applied on the design (Smeulders, Worring, Santini, Gupta, & Jain, 2000).

5. Modeling the Repository

The goal of this paper is to develop a framework for the information content, structure, and the realization of a digital multimedia library as a repository of Banarasi Saree designs. The repository will include traditional designs of Banarasi sarees from different historical periods. The model architecture represents a web-based hypermedia repository, which means that the presentation of complex multimedia content over the Internet will be simplified. The content will be structured in a hypermedia way, i.e., some digital images point to other ones. In this way, the user can search the content by various searching categories. The repository will include data about the designer, the material used, and the category. It will also contain links to other digital objects and collections, keywords, and so on. That information will be used for the semantic annotation and indexing of the digital objects, which will facilitate their locating during search requests, and their web-based representation.

Traditional Banarasi sarees designs are recognized as one of the most significant designs among traditional textiles. Regrettably, it is still being neglected in digital documentation and has not gained deserved recognition in the world community. The accessibility of these cultural and historical ancestries would be enhanced greatly if these will be digitized, classified, and made available over the Internet. That would allow the preservation and even the future digital restoration of a large number of rare specimens of designs from various periods. The need for wide accessibility and popularisation is even bigger for the Banarasi sarees. Therefore, their idiosyncratic art and exceptional values must be made available in the global information medium so that they become accessible to the wide population of society. The main objective of this repository is to preserve the cultural heritage of designs of Banarasi sarees. This proposed framework has divided into three Sections. In the First Section, we discussed the graphical presentation (abstraction of the repository). The Second section is how to design of database and documentation the database. The final third part System Design and Coding of Proposed Framework.

The first part is about the description of applications and technologies are used in the developing system. The second part is about the web-based information system framework that is going to build. This framework is a layer on top of the web server and providing basic functionality. Finally, the third part focus on targeted users and the suggested mechanism for operation.

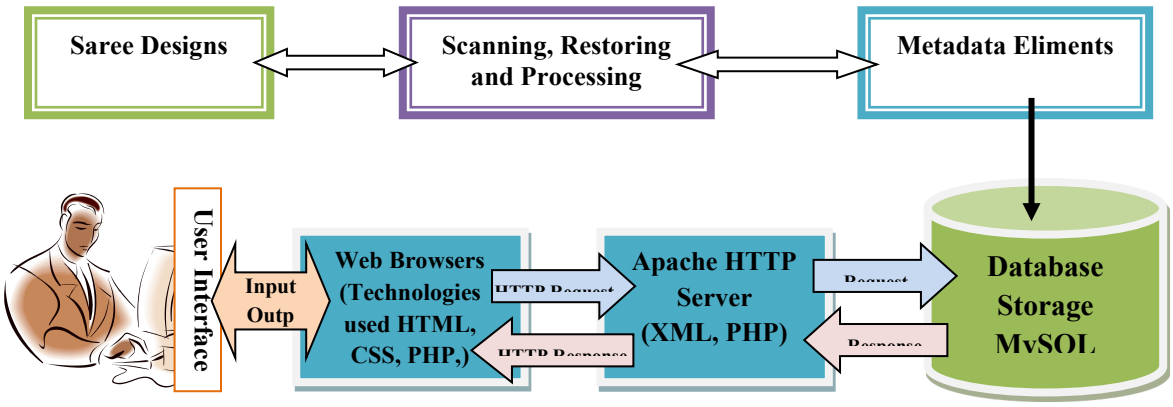


Figure 2: User Interface and repository block diagram

5.1 Data Flow Diagram of Proposed Framework

In the Software engineering or Software development process the data flow diagram (DFD) can be drawn to represent the system of different levels of presentation (Abstraction). In this proposed framework we have used the zero-level of repository presentation (Abstraction).

Figure 3: Zero level Data Flow Diagram

Figure 3 shows our proposed Framework repository at Zero level Data Flow Diagram. It is also known as a context diagram. It's considered to be an idea, view, presentation of a system as a single process with its association to external entities. It represents the entire system as a single bubble diagram with input and output data indicated by incoming and outgoing arrow marks.

5.2 Data Model of Proposed Framework

Data models are a collection of conceptual tools used for describing data, data relationships, data semantics, and constraints. A model is an abstraction process that wide superfluous detail of the application. Data modeling is used to represent entities of interest and their relationship in the database. The Entity-Relationship Model is a high-level conceptual data model we used.

5.2.1. Entity-Relationship Model

A conceptual data model is a set of concepts that describe the structure of a database and associate retrieval and updation on the database. ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationships for our proposed repository.

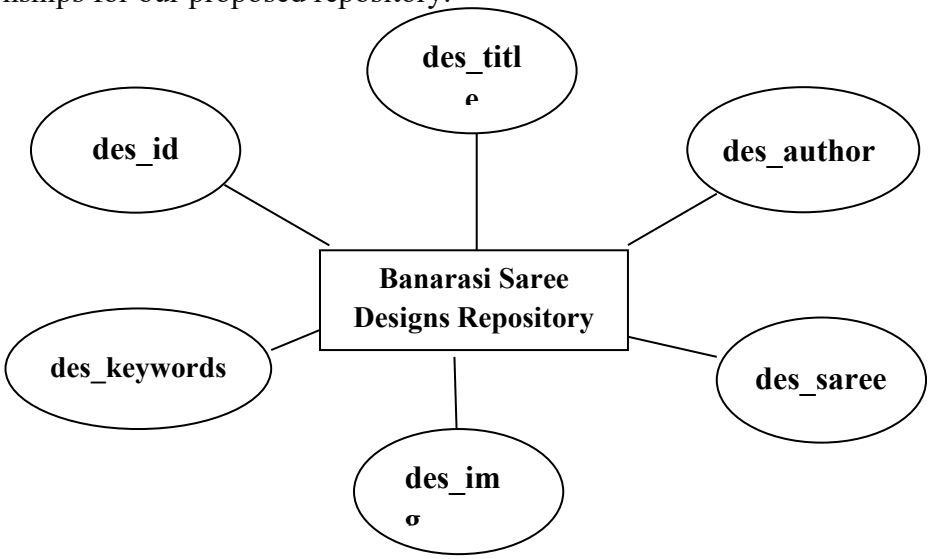


Figure 4: ER diagram for the repository

An entity is capable of representing any object, class, person, or thing. An entity has represented as rectangles in the ER diagram. This figure has one entity namely Repository. The attribute is used to describe the property of an entity. Eclipse is used to represent an attribute. This figure has six attributes namely des_id, des_title, des_author, des_keyword, des_img, des_saree. The attributes site_id has the primary key attribute of the ER diagram.

5.3. Use Case Diagram

The most important aspect is to capture the dynamic behavior to develop a repository. Dynamic behavior means the behavior of the system when it is running/operating. Only static behavior is not sufficient to model a system rather dynamic behavior is more important than static behavior.

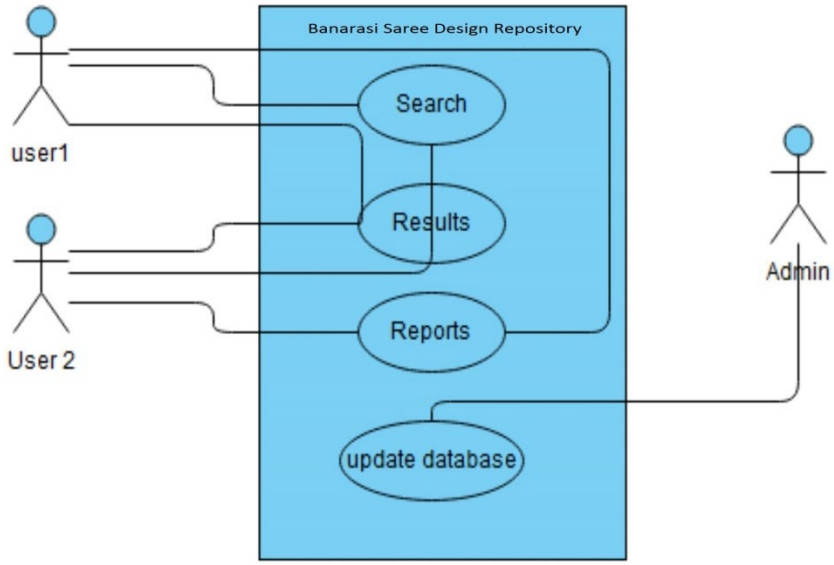


Figure 5: Use Case Diagram for the repository

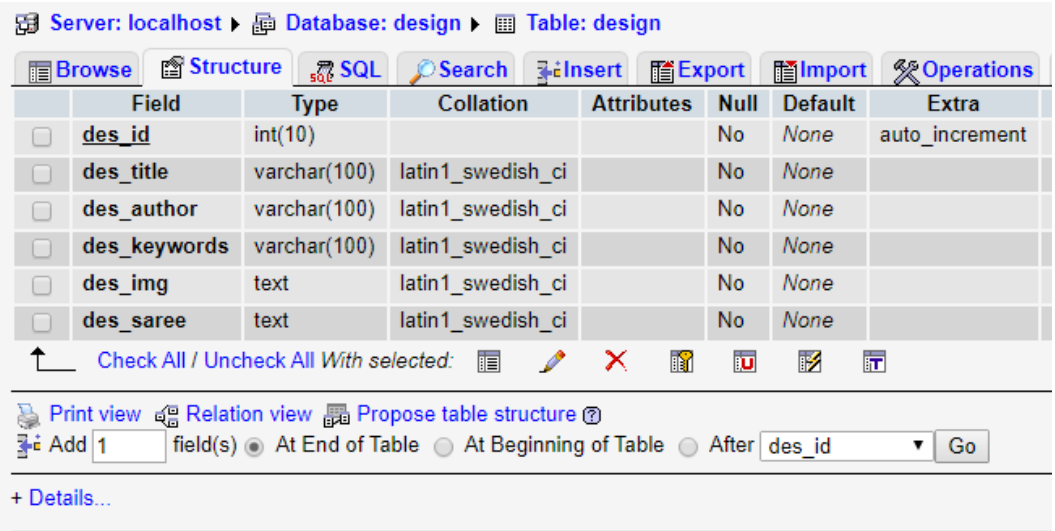
The model relies on the idea that the unity of the text information and the high quality of the digital images will represent the virtues of the Banarasi Saree designs in their entirety and will contribute to its preservation, wider exhibition, and future potential restoration. The repository will be developed for the exploration and comparison of handmade designs and the designs woven over the fabrics. The repository will lay the foundations of the registration, documentation, and exploration of a practically unlimited number of designs.

6. The framework of the repository

The repository is created on Apache HTTP Server which is free and open-source cross-platform web server software developed and maintained by an open community of developers under the auspices of the Apache Software Foundation. The MySQL database is used which is an open-source relational database management system (RDBMS). The Hypertext Preprocessor (or simply PHP) is used for coding the program which is a general-purpose programming language originally designed for web development.

The phpMyAdmin profile is created with the user name ‘root’ and the password is left blank.

A table named ‘design’ is created in the database. The table contains 6 columns as fields and the field name is provided. The first field is `des_id` which is ‘INT’ type, used for the numeric value and the length limit is 10 characters. This field is used to allot a unique number to each record. The second field is `des_title` for storing the title of the document. This is a ‘VARCHAR’ type field that allows storing different characters in the field. The field limit is 300 characters. The third field is `des_author` for storing the author's name. This is also a ‘VARCHAR’ type field and the length is 100 characters. The fourth field `des_keywords` for storing the keywords of the images. The fifth and sixth fields (`des_img` & `des_saree`) are for storing files in the database. These are the ‘TEXT’ type field to store file names and the limit is 100 characters.



The `des_id` field is checked A_I comments which are used for auto-increment. This field is the primary field for allotting a sequential number to the records.

7. The Design of the input page

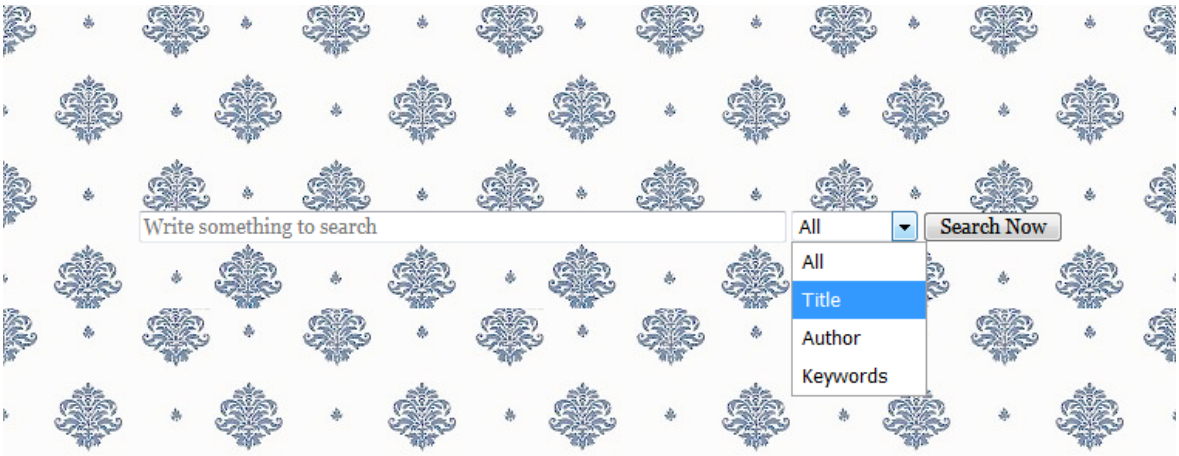
A design input page ‘insert_design.php ’is created to add data elements and documents to the database. The first portion of the page is written in HTML and the second portion is created in PHP to link the page with the database. A form is created for entering data into the database. The header row is described as the header of the table and is named ‘Inserting new design’. The first cell of the first row is named ‘`Design Title`’ to add the title of the document and the second cell is for input the text for storing data in the ‘`des_title`’ field of the database. The second row is designed to adding data about the author of the document. The first cell is labeled as ‘`Design Author`’ and the second cell is an input cell where author

data can be stored. The data is linked to the 'des_author' field of the database. The third row of the column is defined as 'Design Keywords' for entering the keyword which is going to be indexed and searched. A data entry bar is created to enter keywords that are stored in the 'des_keywords' field of the database. The next row is designed to upload files to the database. The file cell is a labeled field named 'Design Sketch' and the second cell is an input form to upload files. The uploaded files are stored in the 'des_img' field of the database and moved a copy of the file in the 'img' folder of the server. The next cell is labeled as 'Design Fabric' and the second cell is an input form to upload file files. The uploaded files are stored in the 'des_saree' field of the database and moved a copy of the file in the 'fabric' folder of the server. A submit button is also added to store the data in the database. The PHP part is started after finishing the HTML part the first work is to connect the database with the input form. The mysql_connect command is used to connect the database with the page. The server name provided as "localhost", the user name is "root" and the password portion is left blank by using a "," because the password is not created to login in the MySql. The next line is written to select the 'search' database which is created for the project because there are already many databases in the MySql. The next portion is a script written to catch all data coming from the above form. If the submit button is posted or clicked, the above script will be executed to add the data to the database. A query is created to display a message when data is not inserted in the table. Another command 'exit' was created so that an error message 'Please fill all the fields' will be displayed and the code will be not executed further. A code 'else' is also created so that if all fields are filled, the code will be executed to insert data in the table. Another query is created to confirm the data saving in the database. A message 'Data inserted into table' will be flashed after saving the data in the table.

8. The User Search Interface

The search interface is created using HTML and a CSS style sheet. The page is described here as XHTML which is a cleaner and stricter version of HTML. The title section is given for displaying the website name on the title bar of the browser when the website is loaded. The Design Collection name is provided for the title and header. The header is also hyperlinked with the home page to navigate the home page quickly. The form tag is used for creating the search bar. The action defined for the search bar is to redirect the 'result' page by the get method. The input type defined as text and named as user_query to get the desired result from the database. The next section is defined as a search field.

The four dropdown options are created to define the search field. The first option is labeled as 'All' and used to search the term in the `des_title`, `des_author` and `des_keywords` fields. The next option is created with the label 'Title' to search the term in the `des_title` field. The next option is labeled as 'Author' to search the given term in the `des_author` field. The last option is labeled as 'Keywords' to search given the term in the `des_keywords` field of the database.

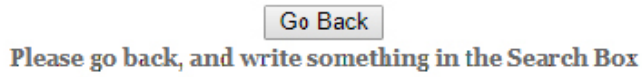


The submit button is created next to the search bar for the execution of the search process. The last section of the page is the footer page. The copyright statement is provided here as a footer.

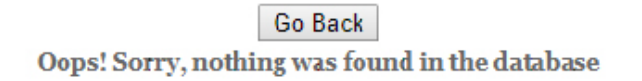
9. The structure of the result page

The result page is created in PHP namely 'result.php' to show the retrieved results. The page has two sections, the first is for interface and layout and the second section is contained data retrieval-related programming. The first section is described as XHTML. The next section is the title and header section. A table with a "0" border is created to align the result from both sides to show the result in a structured way. The width of the table is defined as 770 characters

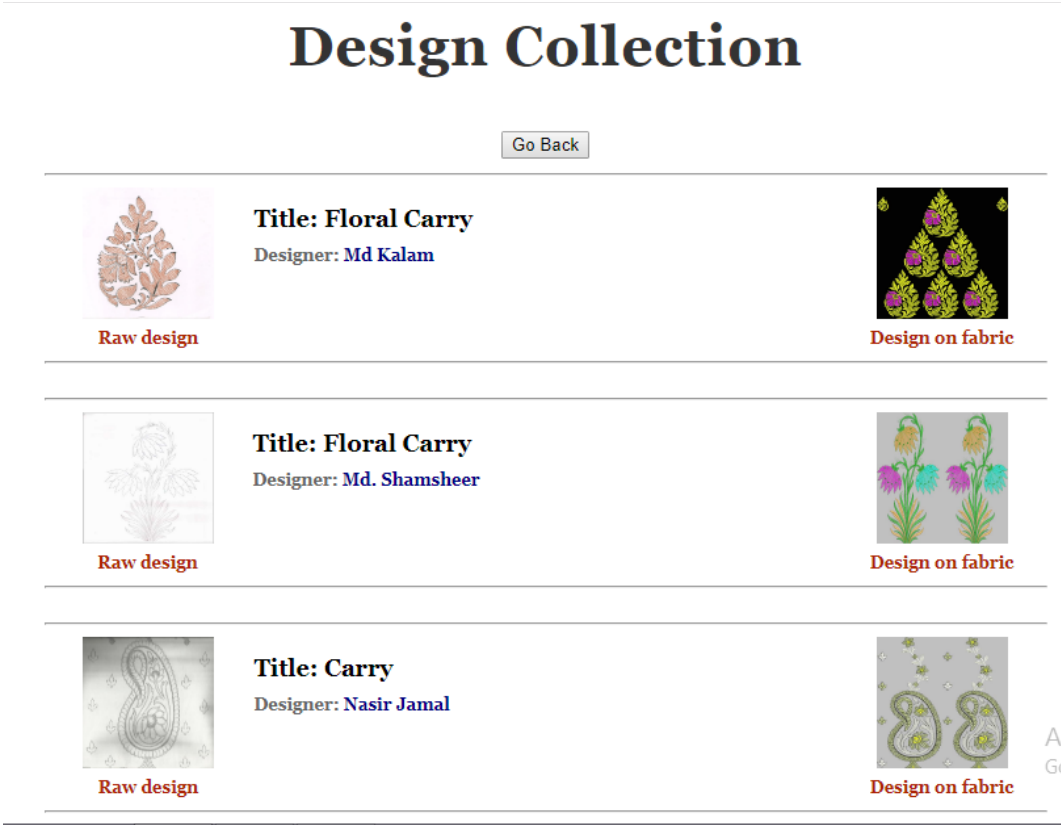
long. A button namely ‘Go Back’ with hyperlinked to the search page is also added in the first row of the table. This button will help to go back to the search page after viewing the result. A condition argument is created which means, if the search bar has no value then the following error message will be displayed and the exit code will stop to further execute the codes.



Another search query is created to search for data in the three major fields. When a search term is entered and the option is selected ‘All’ then the search will be performed in three fields i.e. `des_title, des_author` and `des_keywords`. Wherever the search term will be available the data will be retrieved. Another search query is created to search for data in the title field. When a search term is entered and the option is selected ‘Title’ then the search will be performed in only the `des_title` field and data will be retrieved. The next search query is created to search for data in the author field. When a search term is entered and the option is selected ‘Author’ then the search will be performed in the `des_author` field only and data will be retrieved. The next search query is created to search for data in the keywords field. When a search term is entered and the option is selected ‘Keywords’ then the search will be performed in the `des_keywords` field only and data will be retrieved. Now, the `$run_result` is used to run the query and show the result. A condition is created here using `if($mysql_num_rows ($run_result)<1)` which means if the search term retrieval is less than 1, then the following error message will be displayed.



Now, a while loop is created to fetch the data from the database. The sequence of the field is mentioned here to display the result. The first portion of the result displays a thumbnail of the raw design made over the paper. The next section has the title and author name display of the designs. The next section is also a thumbnail to show the design waved over the fabric. The search result is displayed by `echo` statement. A horizontal line is added at the beginning and end of the result to separate one record from the others. A javascript program is also added to view the full length of both images.



An image viewer is also added to the result page where the images can be seen in full view. The users have to click on the image thumbnail and the image will be opened in the image viewer

10. Conclusions

Traditional Banarasi saree designs are a fusion of Persian and traditional Indian art. Banarasi designs are considered heritage because of their uniqueness. There are very few old textile designs still in existence because they were either destroyed by the climate with its alternation between wet and dry heat which is so harmful to textiles, or by the owners who

were tired of old fabrics and burned them to reclaim the gold. In this paper, we introduced a model for developing a cultural repository for significant cultural and historical designs of Banarasi sarees. Developing a Cultural Repository for Banarasi Saree Designs can be a solution to preserve and protect these designs so that they can be available for researchers, students and people in the future.

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